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confectionery or bakery wares will at once make the acquaintance of margarine; only the preparation of all food in one's own house insures safety. Margarine has won this position in spite of all compulsory declarations, in spite of the foreign-sounding name, because it fills the need of the people for a cheap fat. Leaving out one recent case where the criminal negligence of a firm in carelessly selling a poisonous foreign fat caused many cases of illness and some deaths, so far there has not been much with which margarine can be reproached.

K. B. LEHMAN

HYGIENIC INSTITUTE,
WÜRZBURG

SCIENTIFIC BOOKS

Planktonkunde. Von DR. ADOLF STEUER. Leipzig und Berlin, Teubner. 1910. Pp. xv + 723. Mit 365 Abbildungen im Text und 1 Tafel.

Leitfaden der Planktonkunde. Von DR. ADOLF STEUER. Leipzig und Berlin, Teubner. Pp. 382. Mit 279 Abbildungen im Text und 1 Tafel. M. 7. Geb. M. 8.

Many additions have been made to our knowledge of the floating life of the sea and its counterpart in fresh water, the plankton, since Haeckel published his highly theoretical "Plankton-Studien" with its elaborate but never generally adopted nomenclature and classification of this domain of life. The work of the Kiel school and its Plankton Expedition and Henson's Danaid task of taking a census of the sea, the *Valdivia* expedition with its superbly illustrated reports, the various expeditions of the Prince of Monaco, of the U. S. Steamer *Albatross* under the direction of the late Alexander Agassiz, the work of the International Commission for the Investigation of the Sea and the investigations of the fresh-water stations in Denmark, Germany, Switzerland and the United States have resulted in the perfection of instruments and methods and the accumulation of a mass of results. Steuer's treatise on planktology thus finds the time opportune for appearance and fittingly forms a volume in the

Teubner series ("Naturwissenschaft und Technik in Lehre und Forschung") under the editorship of Professors Doflein and Fischer, of Munich.

The first work is comprehensive in plan, covering all phases of the varied content of the subject of the life of the sea and of fresh water. The first chapter of the work deals with water, its distribution on the earth, chemical constituents, temperature changes, its relations to light and pressure, its color and odor, and its movements under meteorological influences. Other chapters treat of methods, quantitative, qualitative and statistical, of plankton investigations, of the adaptations of the plankton to flotation with special reference to viscosity in relation to temperature and season, of adaptations in color, and of phosphorescence.

It appears that the data cited by Steuer are quite inadequate to establish his thesis that the organisms of the plankton as compared with those of the bottom and shore are characterized by a relatively low rate of reproduction. It is not the pelagic nature of the organism which is the cause of the low rate of reproduction often observed in plankton-poor lakes but rather a poverty stricken habitat. The herring fisheries, the chalk beds of past ages, the abundant and rapidly fluctuating plankton of enriched rivers, the occasional sudden outbursts of the "mare sporco," all bear indisputable evidence of the capacity of pelagic life to respond to opportunities for rapid multiplication. This erroneous idea that the plankton has a relatively slight capacity for reproduction is correlated with another all too widely applied idea, namely, that the tropical seas are relatively barren. The facts are that fresh waters and the sea vary greatly in different regions and at different seasons in the amount of life they contain. In warm waters the chemical processes of life are so accelerated that life cycles are shortened and decay is hastened, while in colder waters growth and decay are slower and individuals accumulate though the total product in the two regions in a given time may be the same. Food supply and temperature affect

the rate and amount of reproduction in water as they do upon land.

The question of the biological stratification of the haliplankton is treated at length. Investigation has shown that the marine phytoplankton is mainly limited to a relatively thin superficial region about 200 m. in thickness and that it ceases to grow below 400 m. The zooplankton on the other hand descends, in the opinion of many investigators, to greater depths, feeding upon the débris of the phytoplankton and upon cadavers, descending from the more densely populated zone above. The *Valdivia*, which made but few hauls at great distances from continental influence or away from great currents, found evidence in closing net catches of animal life extending to great depths.

Steuer's presentation of Agassiz's results and conclusions in this contested matter is far from adequate. He designates the Pacific as "sehr planktonarme" and "wenig günstig" for the examination of this question of the extent of life below 400 fathoms. The plankton of the Pacific is certainly as rich in large areas and probably no poorer in others than that of other oceans, while the oceanic conditions it presents for investigation could hardly be more typical or more favorable for the determination of this question. Nor is Steuer's statement that Agassiz's admission of the existence of a true bathybic plankton is to be accepted as placing him in accord with his opponents, to be regarded as either adequate or critical, for Agassiz limited this bathybic plankton to regions of continental influence and to territories below richly laden currents. Furthermore, to characterize Agassiz's discoveries of so-called deep sea animals, such as *Pelagothuria* and fishes as "gelegentliche Auftretungen" of the bathybic fauna in the upper levels of the sea is to dismiss a mass of evidence with a wave of the hand.

The horizontal divisions and the geographical and seasonal distribution of the plankton are discussed at length and its relation to the economy of nature and to man are analyzed. Under the latter caption attention is called to the relation of those occasional outbursts of

species resulting in discolored seas and disturbances in the balance of nature, to plankton as a source of food for man and for fishes, to pond culture, to purification of polluted streams, to fish culture, to plankton as an index of productive capacity of water, and to the relations of plankton organisms to education, research and the fine arts.

A compiled work of this sort, the first in its field, is necessarily incomplete and imperfect. Noticeable omissions in both works are the Lucas sounding machine, Whipple's thermophone, Nathanson's discussion of the relation of vertical circulation to the problem of maintenance of fertility of the sea, Petterssen's, Ekman's and Nansen's contributions to facts and theories of oceanic circulation, Bauer's work on vertical migrations, and, in general, an occasional lack of perspective in dealing with the results of Scandinavian, English, French and American literature of the subject—defects easily remedied in a new edition. Dr. Steuer has done a great service in putting in so concise and compact a form the most striking and many noteworthy achievements in the field of planktology. The illustrations are numerous, usually good and well-executed. Exception may be taken to inverted figures of *Ceratium* (p. 476) and to an inverted figure from Okamura of a crushed Peridinin labelled *Gonyaulax polygramma*. Much better figures of this species have long been available.

The second work is an abridgment of the first, omitting some of the illustrations, the extensive bibliographies and some of the more technical treatment of the chemistry and physics of water and some of the details of the discussion of the seasonal distribution of the plankton.

CHARLES ATWOOD KOFOID

UNIVERSITY OF CALIFORNIA

The Realm of Ends or Pluralism and Theism: The Gifford Lectures Delivered in the University of St. Andrews in the Years 1907-1910. By JAMES WARD, Sc.D. (Camb.), etc., Fellow of the British Academy and of the New York Academy of Sciences, Professor